



Victoria Shanghai Academy

Year 6 (MYP 1)
Mathematics
Algebra and Pattern

Name: _____

Class: _____ ()

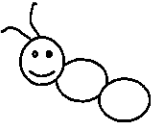
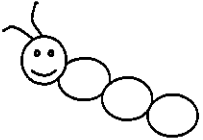
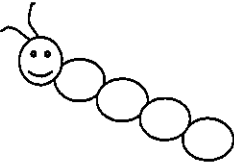
Checking My Own Progress

I have successfully finished the followings (write the dates inside the appropriate boxes)

Page	Topic	Finished	Answer checked	Corrections done	Teachers comment
3-4	Growing Patterns WS1 Growing Caterpillars				
5-6	Growing Patterns WS2 The Rocket Pattern				
7-8	Growing Patterns WS3 Tables & Chairs				
9-10	Growing Patterns WS4 Hexagon Dragons				
11-12	Growing Patterns WS5 Growing Fir Tree				
13	Algebra Expression Ex 1, Ex 2 & Ex 3				
14-15	What are equations H&H Ex 20A				
16-17	Solving simple equations by inspection and trial and error H&H Ex 20B				
18-20	Solving simple equations by maintaining balance H&H Ex 20C.1, Ex 20C.2				
21-23	Solving simple equations by inverse operation H&H Ex 20D				
24	H&H Review Set 18A				
25	H&H Review Set 20A				
26	H&H Review Set 20B				
27	Longman Ex 4A & 4B				
28	Longman Ex 5A & 5B				
29-30	Function machine (examples)				
31-40	Answer Key for Growing Patterns (WS1- WS5)				
41-42	Answer Key for H&H Exercise				
43-44	Answer Key for Longman Exercise				

Worksheet 1

Growing Patterns**Growing Caterpillars**

				
1 day old	2 days old	3 days old	4 days old	5 days old

1**PROBLEM:**

Students in Ms. Dee's year one class are investigating the relationship between the age and number of circles of a growing caterpillar. Help her students to find out the pattern and rule to draw a caterpillar of any age.

2

1. Draw the next two caterpillars.
2. Complete the table of values.
3. Plot the data as line graphs on the graph paper provided (the first two points have been plotted for you).
4. Predict what the 10 days old caterpillar will look like and tell how many circles you would need to draw. Explain any pattern you used to find this answer.

4

Years old	Number of circles
1	3
2	4
3	
4	
5	
6	

Challenge

- Use your pattern to complete this table without drawing a picture or using manipulatives.
- Write the rule as an algebraic expression for the number of circles (C) in terms of the age (d) of the caterpillars

C =

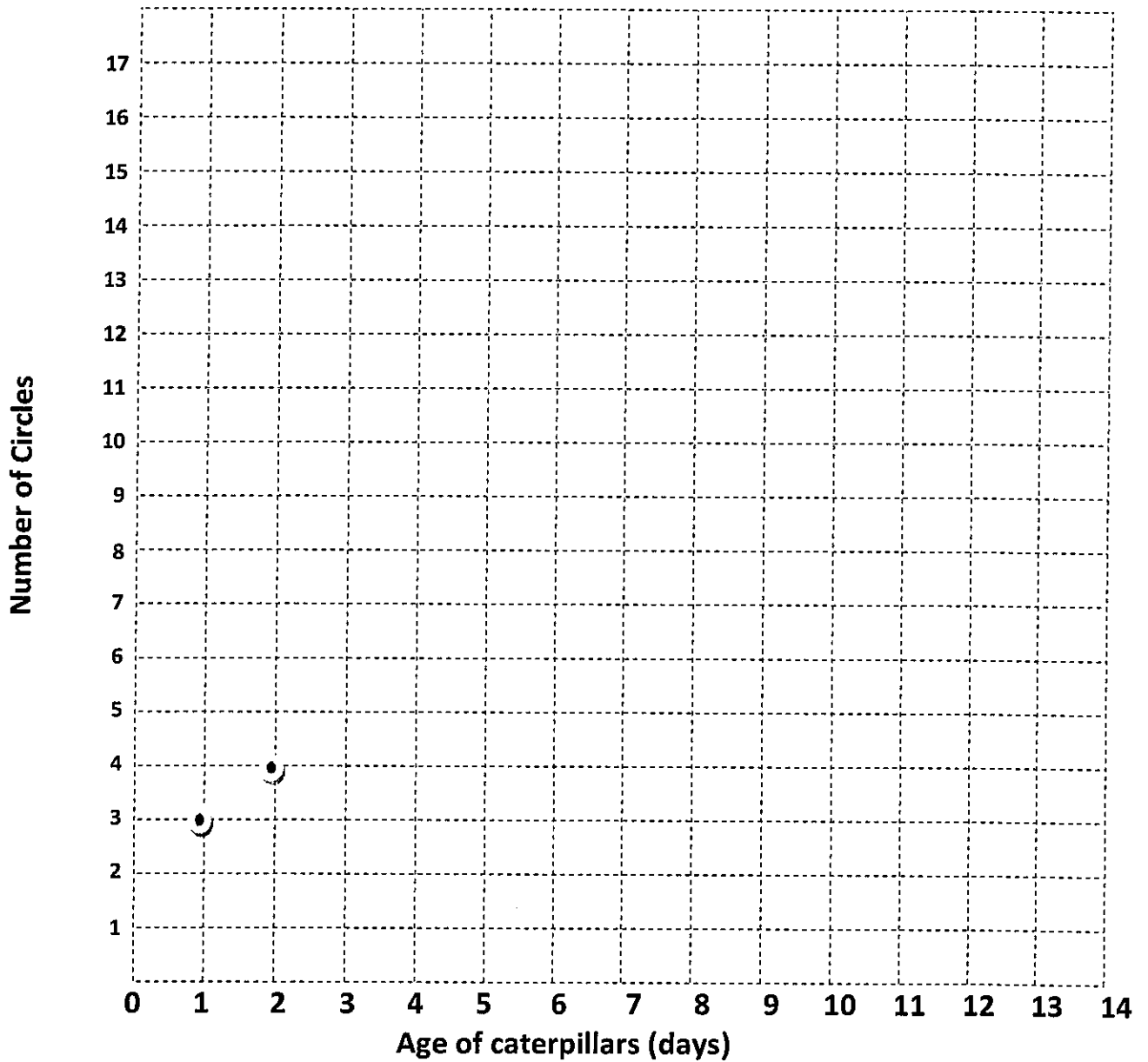
Age in days (d)	Number of circles (C)
10	
25	
100	

Growing Patterns

Growing Caterpillars




3

Relationship between number of circles and caterpillar's age



Worksheet 2 Growing Patterns

The Rocket Pattern

				
Stage 1	Stage 2	Stage 3	Stage 4	Stage 5

PROBLEM:

Students in Mr. Mok's year five class are using pattern blocks to build rocket patterns. Help his students find out the rocket pattern and rule to draw a rocket at any stage.

1. Draw the stage 4 and stage 5 rockets.
2. Complete the table of values.
3. Plot the data as line graphs on the graph paper provided (the first two points have been plotted for you).
4. Predict what the stage 10 rocket will look like and tell how many pieces you would need to built it. Explain any pattern you used to find this answer.

4

2

Stage	Rocket pieces + Puffs	Total number of blocks
1	__+__	4
2	__+__	5
3		
4		
5		
6		

Challenge

- Use your pattern to complete this table without drawing a picture or using manipulatives.
- Write the rule as an algebraic expression for the total number of pieces (P) in terms of the stage of the rocket (s)

P =

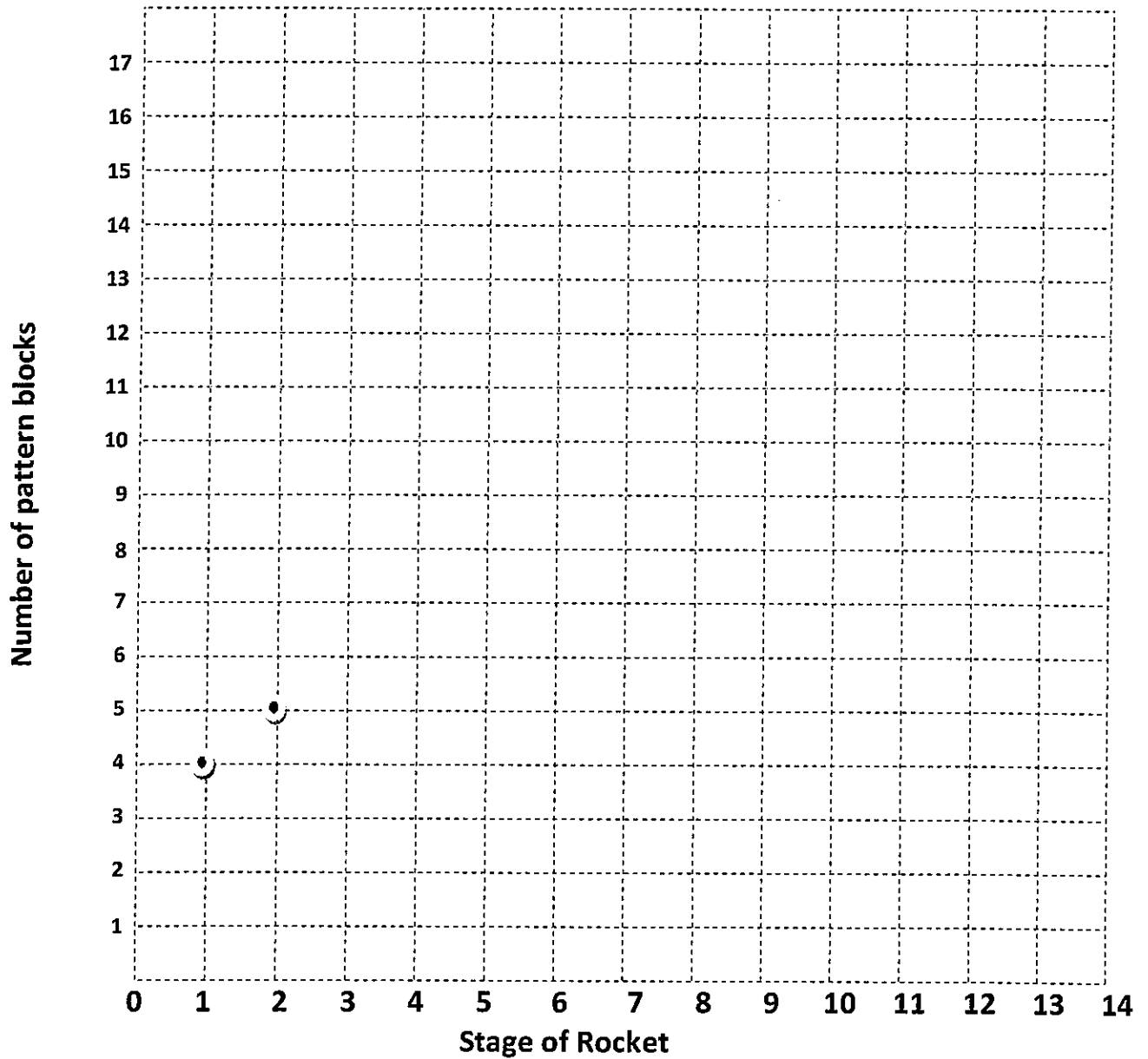
Stage (s)	Total number of pieces (P)
10	
25	
100	

Growing Patterns

The Rocket Pattern

3

Number of pattern blocks used to build different stages rocket



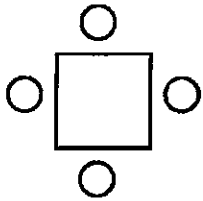
Worksheet 3 **Growing Patterns****Tables & Chairs Investigation**

Figure 1

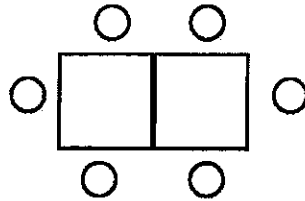


Figure 2

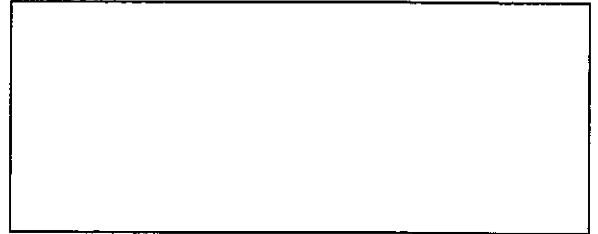


Figure 3

PROBLEM: Restaurants often use small square tables to seat customers. One chair is placed on each side of the table. Four chairs fit around one square table [Figure 1]. Restaurants handle larger groups of customers by pushing together tables. Two tables pushed together [Figure 2] will seat six customers.

1. Draw a diagram showing how many customers would be seated at three square tables pushed together [Figure 3].
2. Complete the table for reference:
3. Plot the data as a line graph on the graph paper provided (the first two points have been plotted for you).
4. Find a pattern you can use to predict the number of customers that may be seated at any size table and describe the pattern in words.



Number of Tables	Number of Customers
1	4
2	6
3	
4	
5	
6	

CHALLENGE:

- Use your pattern to complete this table without drawing a picture or using manipulatives.
- Write the rule as an algebraic expression for the number of customers (C) in terms of the number of tables (t).

$$C =$$

Number of Tables (t)	Number of Customers (C)
10	
25	
100	

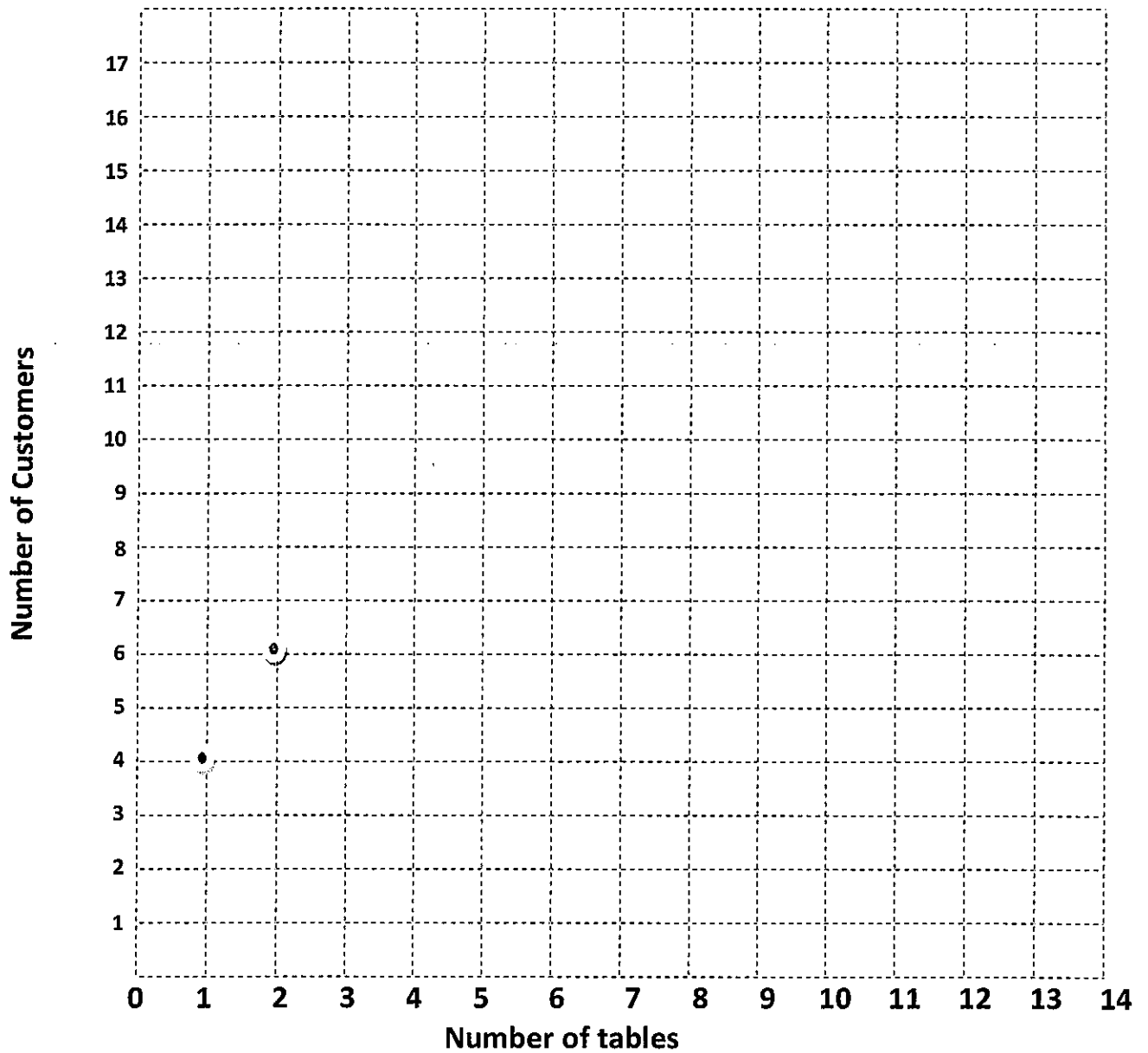
Growing Patterns

Tables & Chairs Investigation

3


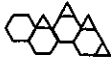
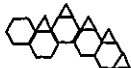
[Graph 1]

Relationship between number of tables and customers



Worksheet 4 Growing Patterns

Hexagon Dragons

				
Dragon #1	Dragon #2	Dragon #3	Dragon #4	Dragon #5

PROBLEM:

Students in Mr. Bridge's class are making up their own growing patterns. Maria uses pattern blocks to make a growing dragon. Help her to finish the tasks that Mr. Bridge has set for her.

1. Use pattern blocks to build and draw the next two dragons in this pattern.
2. Complete the table of values.
3. Plot the data as line graphs on the graph paper provided (the first two points have been plotted for you).
4. Predict what the tenth dragon will look like and tell how many blocks you would need to build it. Explain any pattern you used to find this answer.

2

Dragon #	Number of blocks added	TOTAL number of blocks
1	6	$3+3=6$
2	2	$4+4=8$
3		
4		
5		
6		
7		
8		
9		
10		

4

Challenge

- Maria would like to figure out how many blocks he would need to build the 25th and 100th dragons without actually building it. Write the rule in words or an algebraic expression that Maria can use to figure out the total number of blocks for any dragon without having to build it? Explain how your rule works.

Dragon # (n)	Number of blocks added (A)	TOTAL number of blocks (T)
25		
100		

Growing Patterns

Hexagon Dragons

3

Growing Hexagon Dragons

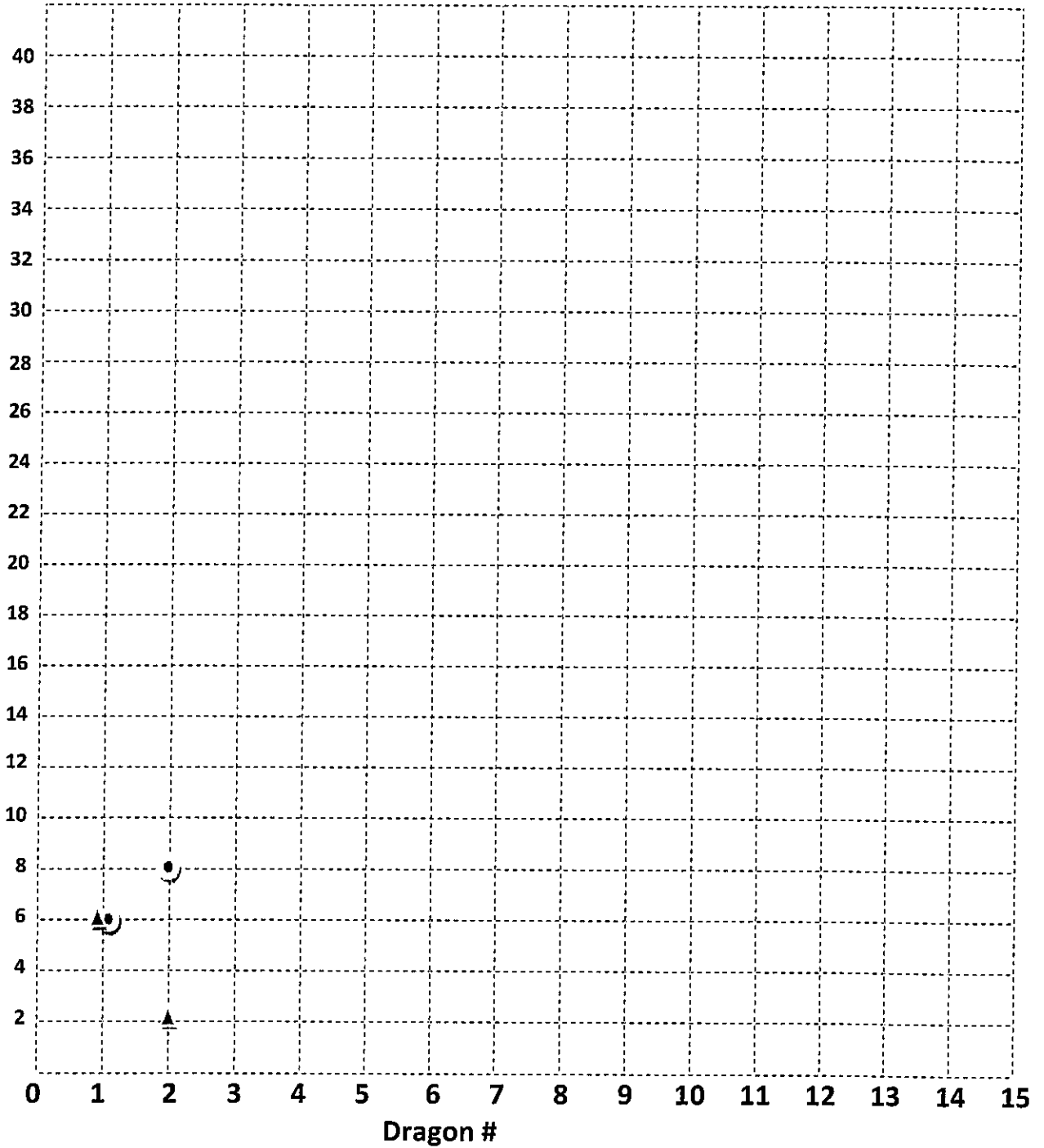
Number of blocks added





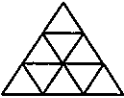
Total number of blocks



Number of blocks



Worksheet 5 **Growing Patterns****Growing Fir Tree**

				
Tree 1	Tree 2	Tree 3	Tree 4	Tree 5

PROBLEM:

Students in Mrs. Como's class are making up their own growing patterns. Angela uses triangle pattern blocks to make a growing fir tree. Help her to finish the tasks that Mrs. Como has set for her.

<p>1. Use pattern blocks to build and draw the next two fir trees in this pattern [Tree 4 and Tree 5].</p> <p>2. Complete the table of values.</p> <p>3. Plot the data as line graphs on the graph paper provided (the first two points have been plotted for you).</p> <p>4. Predict what the tenth fir tree will look like and tell how many blocks you would need to build it. Explain any pattern you used to find this answer.</p>	2	Tree #	Number of blocks added	TOTAL number of blocks
		1	1	1
		2	3	4
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		

4

Challenge

- Use your pattern to complete this table without drawing a picture or using manipulatives.
- Write the rules as algebraic expressions for number of blocks added (A) and the total number of blocks (T) in terms of the number of tree (n).

$$A =$$

$$T =$$

Tree # (n)	Number of blocks added (A)	TOTAL number of blocks (T)
15		
25		
100		

Growing Patterns

Growing Fir Trees

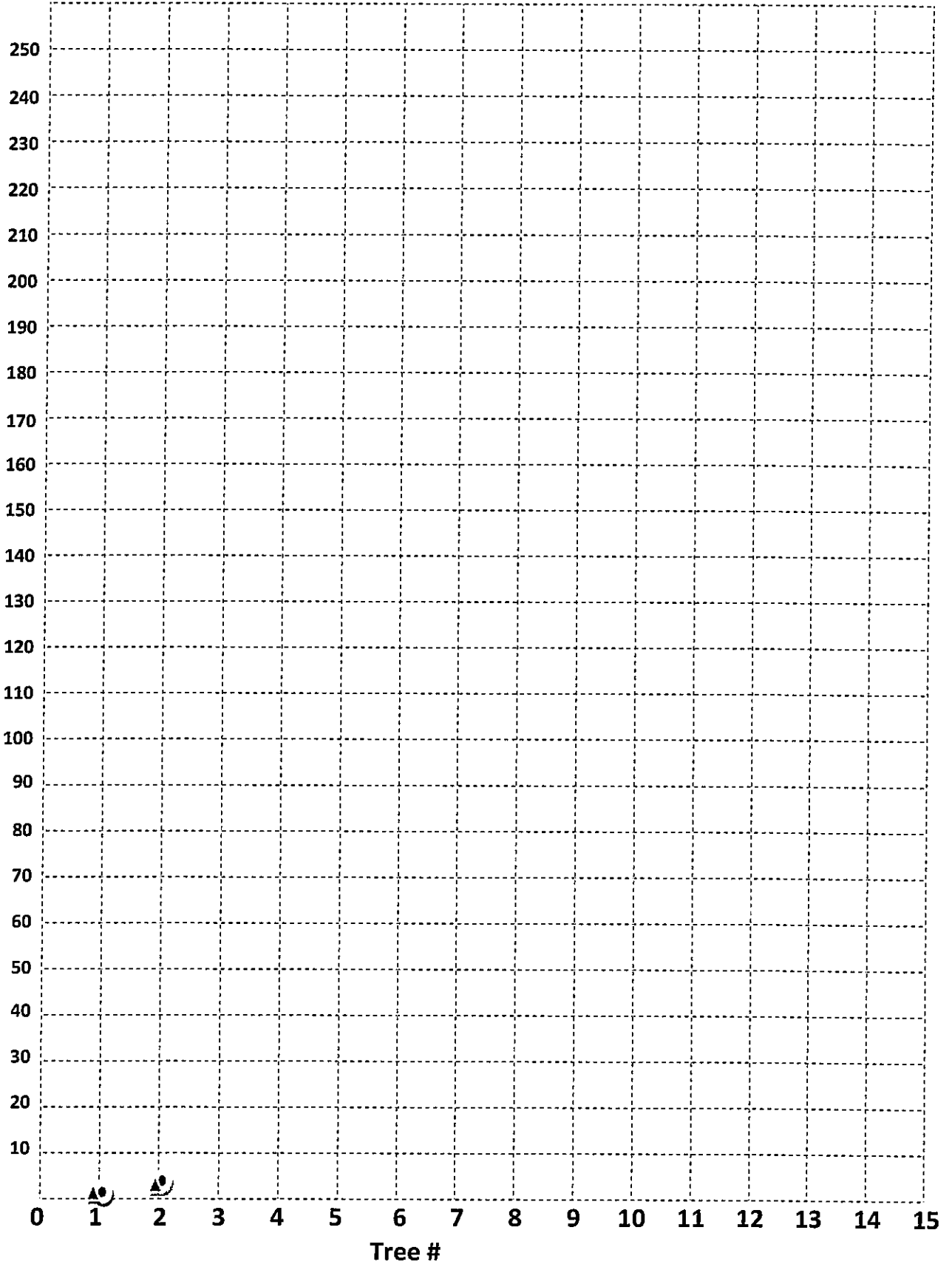
3

Growing Fir Trees

Number of blocks added ▲

Total number of blocks ☺

TOTAL number of triangle blocks used



Algebra Expression

Ex 1: Write an algebraic expression for each question.

(Don't forget about the units!)

1. Chris has \$ y . If he spends on \$40, he has _____ left.
2. David has x mL of water. If he drinks 380 mL of water, he has _____ of water.
3. Hilton is c years old. 5 year later, he will be _____ years old.
4. Carol weights z kg. May weighs 43 kg. They weight _____ altogether.
5. 4 children share x candy canes equally. Each child gets _____ candy canes.
6. There are 4 moon cakes in a box. There are _____ moon cakes in y box.
7. A dozen pens cost \$ a . Each pen costs _____.

Ex 2: Transfer the following mathematical sentences into algebraic expression

- | | |
|---------------------------------|---------------------------------|
| 1. Add y to 15 = _____ | 6. Less than p by 5 = _____ |
| 2. Multiply k by 8 = _____ | 7. More than 13 by g = _____ |
| 3. Subtract 12 from x = _____ | 8. c times 15 = _____ |
| 4. 6 times a = _____ | 9. Subtract s from 15 = _____ |
| 5. Divide b by 4 = _____ | 10. Divide 9 by r = _____ |

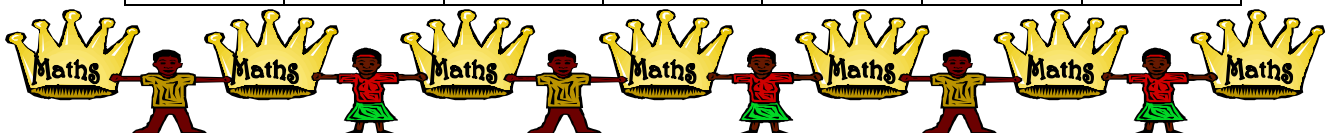
Ex 3: Write the correct number in each box.

y	7	11	13	17	19	21
$y - 6$						

A	3	4	5	6	7	11
$7A$						

B	2	3	4	5	7	20
$\frac{B}{4}$						

X	2	4	6	8	10	12
$X + 5$						
$3X$						
$\frac{X}{10}$						



Basic Algebra and Simple equation

What are equations?

Instructions:

1. Read the definition of equation from different sources:
 - a. (Haese & Harris) Mathematics for the international student 6 MYP 1 (p.374)

A WHAT ARE EQUATIONS?

An **equation** is a mathematical sentence which indicates that two expressions have the same value. An equation always contains an *equal* sign $=$.

A simple equation may be a true numerical statement like $3 \times 5 = 7 + 8$.

$\uparrow \quad \quad \uparrow \quad \quad \uparrow$
LHS equals RHS

Notice that an equation has a **left hand side (LHS)** and a **right hand side (RHS)** and these are separated by the **equal sign**.

An **algebraic equation** like $3x + 2 = 11$ has an **unknown** or **variable** in it, in this case x . To **solve** an equation is to find the value of the variable which makes the equation true.

If we were to replace x by a variety of numbers, most of them would make the equation false.

For example, if $x = 1$ the LHS is $3 \times 1 + 2 = 3 + 2 = 5$ but the RHS = 11

if $x = 5$ the LHS is $3 \times 5 + 2 = 15 + 2 = 17$ but the RHS = 11

However, if $x = 3$ the LHS is $3 \times 3 + 2 = 9 + 2 = 11$ and the RHS = 11.

So, $x = 3$ makes the equation $3x + 2 = 11$ true,

and we say $x = 3$ is the **solution** of the equation $3x + 2 = 11$.

- b. Mathletics – dictionary
 - c. Any other sources – books or websites
2. Discuss with your group members and rewrite the definition of equation in your Mathematics Journal.
 3. What number can replace \square to make the equation true?
 - a. $3 + \square = 10$
 - b. $3 \times \square = 18$
 - c. $20 \div \square = 4$
 - d. $\square - 8 = 4$
 4. Is it an equation or an expression?
 - a. $3 + \square$ (Expression)
 - b. $X - 3 = 7$
 - c. $2(y - 8)$
 - d. $y - 5 = 8 - y$

Challenge for fast workers:

Work on (H&H: Ex 20A)

Finish the set task in your Math Journal, showing clear steps and check your own answers.

EXERCISE 20A

- 1 State whether each of the following is an equation or an expression:
 - a $x - 3 = 7$
 - b $2(x + 4)$
 - c $3 \div 7 + x - 1$
 - d $x - 2 = 7 - x$
 - e $2(x - 1) = 3$
 - f $3 - 2(1 + x)$
- 2 What number can be used to replace \square to make the equation true?
 - a $5 + \square = 15$
 - b $\square + 9 = 22$
 - c $15 - \square = 2$
 - d $\square - 9 = 10$
 - e $5 \times \square = 30$
 - f $\square \div 3 = 8$
 - g $75 \div \square = 15$
 - h $\square \times 4 = 22 + 2$
 - i $\square \times 2 + 1 = 11$
- 3 For each of the following, suppose x is the number. Use the statement to write an equation involving x .
 - a Seven added to a number is equal to ten.
 - b Five subtracted from a number is equal to eleven.
 - c A number multiplied by four is equal to twelve.
 - d A number when divided by ten is equal to two.

Basic Algebra and Simple equation

Solving simple equations by inspection and trial and error

Instructions:

(Answer all questions in your Mathematics Journal)

1. Read the given information on solving simple equations.

(Haese & Harris) Mathematics for the international student 6 MYP 1, p. 375-376)

B

SOLVING SIMPLE EQUATIONS

In this chapter we will be dealing with equations which have **one unknown**.

Remember that in algebra:

- the \times sign is omitted where possible. For example, $5 \times x$ is written $5x$.
- the \div sign is usually written as a fraction. For example, $x \div 3$ is written $\frac{x}{3}$.

In **Chapter 18** we saw that given an expression involving x , we can substitute a value for x to evaluate the expression.

For example, consider the expression $4x - 3$.

When $x = 2$, $4x - 3 = 4 \times 2 - 3 = 5$.

In this chapter we are now presented with equations such as $4x - 3 = 5$. Our task is to work out that x must be 2.

\therefore is read as *therefore*.
We use it to show that the
next line of work follows
from the previous line.

SOLVING BY INSPECTION

Some simple equations can be solved by **inspection**.

For example, for the equation $x + 2 = 8$
we notice that since $6 + 2 = 8$, x must be 6.

We write: $x + 2 = 8$

$$\therefore x = 6$$



Example 2

Self Tutor

Solve by inspection:

a $a + 6 = 11$

c $14 - x = 8$

b $\frac{b}{3} = 8$

d $7p = 49$

a $a + 6 = 11$

$\therefore a = 5$ {as $5 + 6 = 11$ }

c $14 - x = 8$

$\therefore x = 6$ {as $14 - 6 = 8$ }

b $\frac{b}{3} = 8$

$\therefore b = 24$ {as $24 \div 3 = 8$ }

d $7p = 49$

$\therefore p = 7$ {as $7 \times 7 = 49$ }

2. Read the given information on solving simple equations.
(Haese & Harris) Mathematics for the international student 6 MYP 1, p.376)

SOLVING BY TRIAL AND ERROR

Another method of solving simple equations is to use **trial and error**. This involves substituting different numbers in place of x until the correct solution is obtained.

For example, to solve $4x - 13 = 23$ we substitute different values for x and summarise our trials in a table.

So, $x = 9$ is the solution.

x	$4x - 13$	
1	-9	← much too small
5	7	← getting larger
8	19	← almost
9	23	✓

3. Discuss with your group members and list the important information you've learned from 1 and 2.
4. List the two methods you can use to solve simple equations.
5. Solve the following:

1 Solve *by inspection*:

a $7 + a = 15$

d $t \div 4 = 10$

g $n + 7 = 14$

j $t + 3 = 3$

m $x - 7 = -2$

p $x \times x = 0$

s $3x = 60$

v $\frac{6}{n} = 2$

b $48 \div p = 6$

e $* - 14 = 38$

h $8a = 200$

k $7 + m = 19$

n $6 + \square = 9$

q $3 - x = 7$

t $4x = -12$

w $6 = \frac{x}{8}$

c $18 = 25 - n$

f $3 \times d = 18$

i $b \div 7 = 9$

l $t + 9 = 4$

o $y \times 2 = -6$

r $5t = -15$

u $7x = 91$

x $\frac{55}{t} = 11$

3 Solve by *trial and error*:

a $3x + 11 = 32$

d $4x + 11 = 21$

b $4x - 7 = 33$

e $8x = 10$

c $5x - 22 = 23$

f $2 - 5x = -18$

Basic Algebra and Simple equation

Solving simple equations by maintaining balance

Instructions:

(Answer all questions in your Mathematics Journal)

1. Read notes from (Haese & Harris) Mathematics for the international student 6 MYP 1, p. 377-379)

C

MAINTAINING BALANCE

The **balance** of an **equation** can be likened to the **balance** of a **set of scales**. Changing one side of the equation without doing the same thing to the other side will upset the balance.



PERFORMING OPERATIONS ON EQUATIONS

The equal sign represents the balancing point of the equation. The left hand side must balance the right hand side.

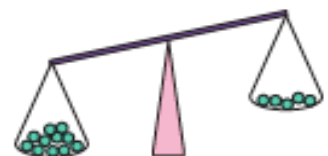
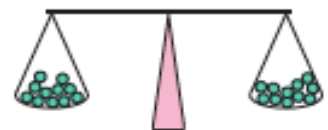
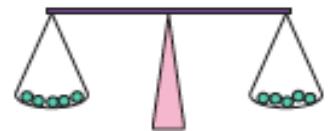
For example, $5 = 5$

If 6 is added to both sides, the statement remains true:

$$5 + 6 = 5 + 6$$
$$\therefore 11 = 11$$

If 6 were added to one side only, then the statement would become false:

$$5 + 6 \neq 5$$
$$\therefore 11 \neq 5$$

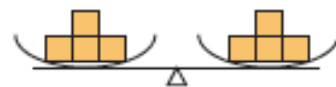


To maintain the balance, whatever is done on one side of the *equal* sign must also be done on the other side.

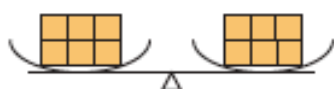
Imagine a set of scales with six identical blocks on each side. The scale is **balanced**.



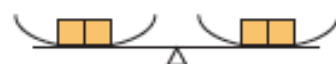
If we subtract 2 blocks from each side we get:



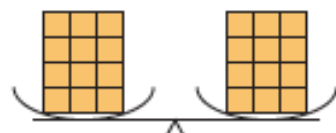
If we add 1 block to each side we get:



If we divide the number of blocks on each side by 3 we get:



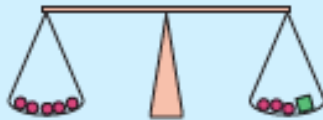
If we multiply the number of blocks on each side by 2 we get:



Notice that the scales are still balanced in each case!

Example 3**Self Tutor**

If the bar is perfectly balanced, find the relationship or connection between the objects:

a

- a** By taking 3● from both sides we can see that
1■ is equal to 2●

b

- b** By taking 2● from both sides we can see that
1△ is equal to 1● plus 1■
So, $\triangle = \bullet + \blacksquare$

BALANCE

The **balance** of an equation will be maintained if we:

- add the same amount to both sides
- subtract the same amount from both sides
- multiply both sides by the same amount
- divide both sides by the same amount.



Q3Stockphoto

Example 4**Self Tutor**

Consider the equation $x + 5 = 10$. What equation results when we perform the following on both sides of the equation:

- a** add 3 **b** subtract 3 **c** divide by 2 **d** multiply by 4?

a $x + 5 = 10$
 $\therefore x + 5 + 3 = 10 + 3$
 $\therefore x + 8 = 13$

b $x + 5 = 10$
 $\therefore x + 5 - 3 = 10 - 3$
 $\therefore x + 2 = 7$

c $x + 5 = 10$
 $\therefore \frac{x + 5}{2} = \frac{10}{2}$
 $\therefore \frac{x + 5}{2} = 5$

d $x + 5 = 10$
 $\therefore 4(x + 5) = 4 \times 10$
 $\therefore 4(x + 5) = 40$

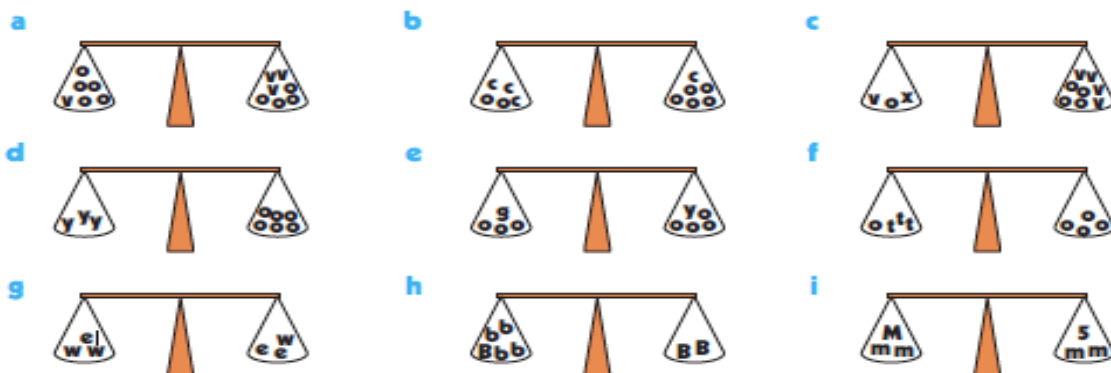
2. Discuss with your group members and list the important information you've learned from the above information.

Challenge for fast workers:

Finish H&H: Ex 20C.1 / Ex 20C.2 and check your own answers.

EXERCISE 20C.1

- 1 These scales are perfectly balanced. Find the relationship between the objects.



- 2 The set of scales is balanced with two bananas and three strawberries on one side and 11 strawberries on the other.



- If three strawberries are taken from the left side, what must be done to the right side to keep the scales balanced?
 - There are now two bananas on the left hand side. How many strawberries balance their weight?
 - How heavy is one banana in terms of strawberries?
- 3 The set of scales is balanced with two golf balls and six marbles on the left and one golf ball and nine marbles on the right.
- If 6 marbles are taken from the left side, what must be done to the right side to keep the scales balanced?
 - If the golf ball on the right side is removed, what must be done to the left side to keep the scales balanced?
 - Redraw the scales if both **a** and **b** occur.
 - How heavy is one golf ball in terms of marbles?



EXERCISE 20C.2

- 1 Find the equation which results from *adding*:

- 3 to both sides of $x = 4$
- 5 to both sides of $x + 7 = 5$
- 5 to both sides of $x - 5 = 8$
- 7 to both sides of $2x - 7 = 3$

- 2 Find the equation which results from *subtracting*:

- 2 from both sides of $x = 8$
- 5 from both sides of $x + 5 = -2$
- 5 from both sides of $5 - x = 9$
- 6 from both sides of $3x + 6 = -1$

- 3 Find the equation which results from *multiplying* both sides of:

- $x = 6$ by 2
- $2x = 1$ by 3
- $\frac{x}{2} = 5$ by 2
- $x + 1 = 9$ by 7
- $\frac{x+1}{2} = -1$ by 2
- $\frac{1-x}{3} = 4$ by 3

- 4 Find the equation which results from *dividing* both sides of:

- $2x = 6$ by 2
- $3(x + 2) = 6$ by 3
- $2x + 6 = 0$ by 2
- $3x + 9 = 15$ by 3
- $3x = 14$ by 3
- $6(x - 1) = 18$ by 6
- $4x - 16 = -4$ by 4
- $8(x + 2) = 24$ by 8

Basic Algebra and Simple equation

Solving simple equations by inverse operation

Instructions:

(Answer all questions in your Mathematics Journal)

1. Read notes from (Haese & Harris) Mathematics for the international student 6 MYP 1, p. 380)

D

INVERSE OPERATIONS

Imagine starting with \$50 in your pocket. You find \$10 and then pay someone \$10. You still have \$50.

This can be illustrated by a **flowchart** such as



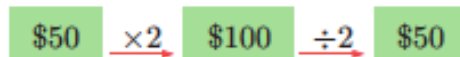
Observe that adding 10 and subtracting 10 have the opposite effect. One undoes the other.

We say that

addition and subtraction are **inverse operations**.

Now imagine you start with \$50, and your friend gives you the same amount. Your money is now doubled. If you decide to give half to your brother, you will be back to your original \$50.

We again illustrate the process by a flowchart:



Observe that multiplying by 2 and dividing by 2 undo each other.

We say that

multiplication and division are **inverse operations**.

We can solve simple equations using *inverse operations*, but we must remember to keep the equation *balanced* by performing the same operation on *both sides* of the equation.

For example,

consider $x + 3 = 7$ where 3 has been added to x .

$\therefore x + 3 - 3 = 7 - 3$ {subtracting 3 is the inverse of adding 3}

$\therefore x = 4$ {simplifying}

2. Discuss with your group members and list the important information you've learned from 1 and 2.

3. State the inverse of the following:

- a. $\times 6$ (answer: $\div 6$)
- b. $- 10$
- c. $+ 5$
- d. $\div \frac{2}{3}$

4. Simplify the following expressions

- a. $m \times 7 \div 7 = (m)$
- b. $x - 25 + 25 = (\quad)$
- c. $u + 8 - 8 = (\quad)$
- d. $m \div \frac{3}{4} \times \frac{4}{3} = (\quad)$

5. Find the unknown using the inverse operation: (Show the steps clearly)

a. $y + 7 = 10$

b. $5t = 20$

Challenge for fast workers:

Work on (H&H: Ex 20D).

Finish the set task in your Math Journal, showing clear steps and check your own answers.

EXERCISE 20D

1 State the inverse of each of the following operations:

a $\times 3$

b $+5$

c -4

d $\div 7$

e $-\frac{3}{4}$

f $\times \frac{2}{3}$

g $+10$

h $\div \frac{1}{3}$

2 Simplify the following expressions:

a $x + 7 - 7$

b $x - 3 + 3$

c $x \div 2 \times 2$

d $3x \div 3$

e $\frac{x}{5} \times 5$

f $\frac{2x}{2}$

g $\frac{2x}{3} \div \frac{2}{3}$

h $\frac{2x}{5} \times 5$

3 Find x using an inverse operation:

a $x + 7 = 10$

b $x + 15 = 6$

c $x + 3 = 0$

d $x + 11 = -4$

e $7 + x = 9$

f $8 + x = 14$

4 Find y using an inverse operation:

a $y - 7 = 4$

b $y - 2 = 0$

c $y - 6 = -1$

d $y - 11 = 32$

e $y - 8 = -8$

f $y - 15 = -32$

5 Find t using an inverse operation:

a $4t = 8$

b $6t = 30$

c $2t = 4$

d $3t = 15$

e $5t = 20$

f $3t = -9$

g $7t = -56$

h $7t = 56$

i $8t = -56$

Notice the
'balancing'!



6 Find d using an inverse operation:

a $\frac{d}{2} = 3$

b $\frac{d}{4} = 7$

c $\frac{d}{2} = 8$

d $\frac{d}{5} = 6$

e $\frac{d}{3} = -4$

f $\frac{d}{7} = -1$

7 Find the unknown using a suitable inverse operation:

a $x + 7 = 0$

b $x - 5 = 6$

c $d + 9 = -1$

d $p - 6 = 8$

e $3g = 15$

f $\frac{x}{4} = 8$

g $7m = 28$

h $\frac{y}{2} = 4$

i $k + 6 = -2$

j $11s = -44$

k $t - 4 = 0$

l $4t = -36$

m $p - 15 = 23$

n $y + 11 = 7$

o $\frac{k}{7} = -2$

p $9n = -72$

q $\frac{e}{13} = 1$

r $n + 13 = 4$

s $\frac{d}{-6} = 12$

t $w - 19 = -6$

u $\frac{y}{-7} = -7$

REVIEW SET 18A

1 Write in algebraic form:

a $x \times 2 \times y$

b $M = 3 \times n + d$

c $b \times a + c \times 3$

d $n \div 3$

e $(a + b) \div c$

f $100 \div (x - 3)$

2 Write in algebraic form:

a the product of c and 2

b treble the sum of a and 6

c 5 more than t

d d less than n

3 Toothpaste costs $\mathcal{L}x$ a tube. What will be the total cost of y tubes?

4 Theatre tickets cost $\$x$ per adult, $\$y$ per senior, and $\$z$ per child. What will be the total cost for 2 adults, 1 senior, and 5 children?

5 If $y = 39 - 4x$, find y when: **a** $x = 2$ **b** $x = 7$.

6 The following pattern is built out of matchsticks: \square , $\square\square$, $\square\square\square$,

a Draw the next 2 figures in the pattern.

b Copy and complete:

Figure number (n)	1	2	3	4	5
Matchsticks needed (M)					

c Find the rule connecting M and n .

d How many matchsticks are needed to build:

i 7 squares

ii 101 squares?

7 TLC Carpet Cleaning Company charges a \$20 callout fee and then \$15 for each room it cleans. Copy and complete the table of values for the charge C dollars for cleaning n rooms:

n	0	1	2	3	4	5
C						

a What is TLC's fee formula?

b Find how much TLC would charge for cleaning a mansion with 27 rooms.

c Draw a line graph of C against n with n on the horizontal axis and $n = 0, 1, 2, 3, \dots, 10$.



REVIEW SET 20A

- 1 A number multiplied by three is equal to eighteen. Find the number.
- 2
 - a Is $2x + 5y = 7$ an equation or an expression?
 - b State the inverse of $\times 6$.
 - c Find the result of adding 8 to both sides of $3x - 8 = 5$.
 - d Solve $2x = -4$ by inspection.
- 3 One of the numbers $\{1, 2, 5, 8\}$ is the solution to the equation $3x + 7 = 22$. Find the solution by trial and error.
- 4 The following scales are perfectly balanced. Find the relationship between the objects:

a



b



- 5 Find x using an inverse operation:

a $5 + x = 11$

b $x - 8 = -2$

c $4x = -32$

d $\frac{x}{3} = -1$

- 6 Copy and complete the following flowcharts:



- 7 Use a flowchart to show how the following expressions are built up from x :

a $\frac{x+4}{6}$

b $4x - 5$

- 8 Use a flowchart to show how to isolate x in the following expressions:

a $\frac{x}{5} + 8$

b $3(x - 9)$

- 9 Solve for x :

a $4x + 5 = 12$

b $\frac{x}{3} = -4$

c $\frac{x}{3} - 5 = 7$

d $11x - 6 = 2$

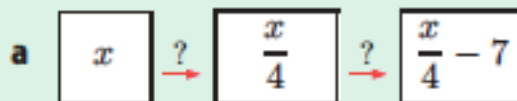
e $4(x - 2) = 20$

f $6(x + 3) = 54$

- 10 Anneke has €13. She is promised the same amount for washing the dishes each night. After seven nights of dishwashing she has €55. How much was she paid each night?

REVIEW SET 20B

- What number can be used to replace \square to make the equation true?
 - $\square \div 9 = 5$
 - $7 \times \square = 25 + 3$
- Solve by inspection: $a \div 6 = 7$.
 - Find the equation which results from adding 6 to both sides of $3x - 6 = 11$.
 - State the inverse of dividing by 7.
 - Solve $\frac{x}{8} = -3$ using a suitable inverse operation.
- One of the numbers $\{2, 3, 5, 10\}$ is the solution to the equation $3x + 5 = 14$. Find the solution by trial and error.
- Find the equation which results from multiplying both sides of $\frac{3-x}{2} = 5$ by 2.
- State the inverse of the following operations: **a** -5 **b** $\times \frac{1}{2}$ **c** $\div 6$.
- Find t using an inverse operation:
 - $t + 9 = 5$
 - $t - 6 = 0$
 - $4t = 20$
 - $\frac{t}{-3} = 8$
- Copy and complete the following flowcharts:



- Use a flowchart to show how the following expressions are built up from x :

a $2(3x - 7)$ **b** $\frac{2x + 3}{6}$

- Use a flowchart to show how to isolate x in the following expressions:

a $\frac{5x - 3}{4}$ **b** $6(2x + 1)$

- Solve for x :

a $4x - 11 = 25$ **b** $5 + 4x = 11$ **c** $\frac{x}{3} - 5 = 8$

d $\frac{x}{5} + 11 = 9$ **e** $3(x + 7) = 30$ **f** $4(x - 8) = 52$

- Julian has been given a bag of chocolate truffles for his birthday. He decides to eat them all by himself. After eating 6 of them, however, he starts feeling ill and does not want any more. He shares the rest with his three sisters. If each of Julian's sisters is given 4 truffles and there is one left over, how many truffles were originally in the bag?

Supplementary Exercise

Ex4A: (Longman Primary Mathematics 6C p.25)

Show workings in your Mathematics Journal.

Don't forget to check the answer

- | | |
|-------------------|--------------------|
| 1. $3x + 8 = 26$ | 6. $6y - 12 = 6$ |
| 2. $5y + 7 = 52$ | 7. $14x - 32 = 10$ |
| 3. $8z + 10 = 34$ | 8. $9z - 40 = 23$ |
| 4. $7w + 5 = 5$ | 9. $12d - 18 = 30$ |
| 5. $4k + 6 = 18$ | 10. $10w - 50 = 0$ |

Ex4B: (Longman Primary Mathematics 6C p.27)

Show workings in your Mathematics Journal.

Don't forget to check the answer

- 6 times a number minus 15 equals 33. Find the number.
- 3 times a number plus 8 equals 23. Find the number.
- Multiply a number by 9 and then add 26. The result is 44. Find the number.
- Multiply a number by 7 and then subtract 13. The result is 36. Find the number.
- Mum bought 3 bottles of orange juice with the same capacity. She used 1200 mL of the orange juice to make some fruit punch. She now has 300 mL left. How many millilitres of orange juice did each bottle contain?
- Dad spent \$644 on 4 adult tickets and 1 child ticket for a circus show. Each child ticket cost \$84. How much did each adult ticket cost?
- Uncle John spent \$37 on 1 ice cream cone which cost \$5 and 8 ice lollies. How much did each ice lolly cost?
- A tin of mixed fruit costs \$6. The cost of 7 tins of ham is \$50 more than a tin of mixed fruit. How much does each tin of ham cost?
- Mum is 38 years old. Her age is 2 years less than 5 times her son's age. How old is her son?
- Kate bought 2 sets of bookmarks. The number of bookmarks was the same in each set. She gave 4 of the bookmarks to her friend and 16 bookmarks are left. How many bookmarks were there in each set originally?
- Tom spent \$16 on some pencils and a pen. The prices of the pencil and the pen were both \$4 each. How many pencils did Tom buy?

Ex5A: (Longman Primary Mathematics 6C p.30)
Show workings in your Mathematics Journal.
Don't forget to check the answer

1. $\frac{e}{5} + 8 = 73$

4. $\frac{w}{10} - 12 = 8$

2. $\frac{y}{8} - 5 = 6$

5. $\frac{y}{9} + 23 = 23$

3. $\frac{u}{7} + 4 = 18$

6. $\frac{m}{6} - 9 = 0$

Ex5B: (Longman Primary Mathematics 6C p.32)

Write and solve the simple equation. Then check the answer.

1. Kevin poured a bottle of soft drink into 5 glasses equally. Then he drank 100 mL of the soft drink from one of the glasses. He has 150 mL left in that glass. How many millilitres of soft drink did the bottle contain?
2. Pupils A, B, C and D share a packet of biscuits equally. If pupil A gives 5 biscuits to pupil B, pupil B has 17 biscuits. How many biscuits are there in the packet?
3. Mum divided a bag of plums into 6 groups equally. Kate ate 8 plums from one of the groups. 5 plums are left in that group. How many plums were there in the bag?
4. Peter divided a box of mangoes into 3 groups equally. The children ate 6 mangoes from one of the groups. 3 mangoes are left in that group. How many mangoes were there in the box?
5. 8 monkeys shared a basket of bananas equally. Monkey B gave 3 bananas to Monkey A. Monkey A then ate all the 15 bananas altogether. How many bananas were there in the basket?

Function Machine (2)

Year 6 Algebra Worksheet – What happened to x ?

What happened to x ?

a. $2x + 5$: First, 2 was multiplied to x , then, 5 was added.

b. $5 + 4x$: First, 4 was multiplied to x , then 5 was added.

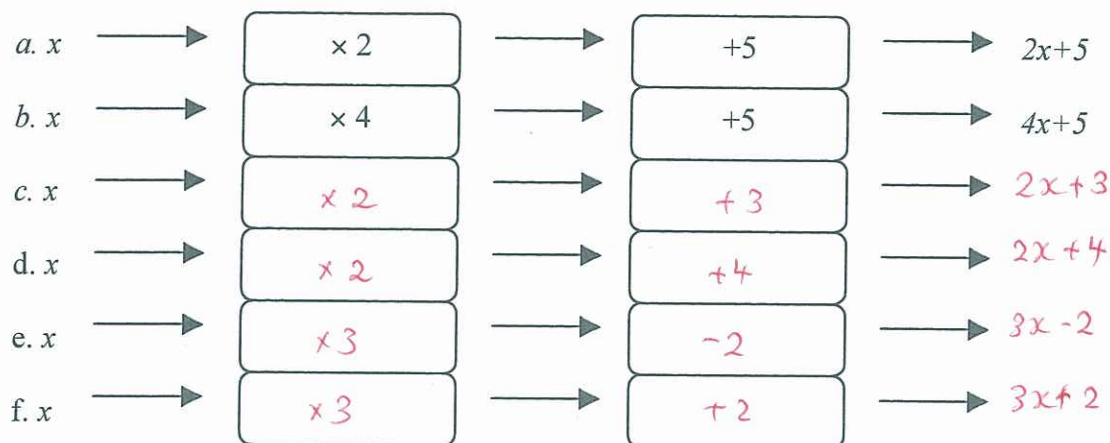
c. $3 + 2x$: First, 2 was multiplied to x , then 3 was added.

d. $2x + 4$: First, 2 was multiplied to x , then 4 was added.

e. $3x - 2$: First, 3 was multiplied to x , then 2 was subtracted.

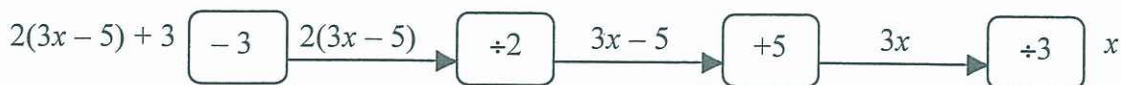
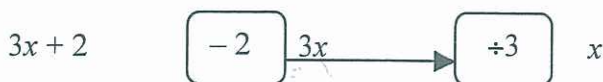
f. $2 + 3x$: First, 3 was multiplied to x , then 2 was added.

The above can be represented in diagram like these:



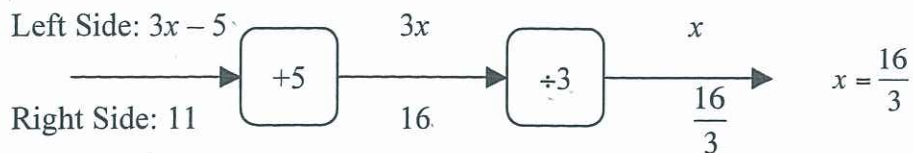
Rescue the x !

Example:

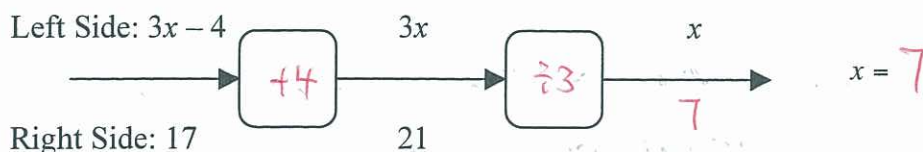


Keeping Both Sides the Same (Equals):

Example: $3x - 5 = 11$



Solve: $3x - 4 = 17$



Solving equations

Example: $4x - 7 = 15$

$$4x - 7 + 7 = 15 + 7 \quad \text{add 7 to both sides}$$

$$4x = 22$$

$$\frac{4x}{4} = \frac{22}{4}$$

divide both sides by 4

$$x = \frac{11}{2}$$

Exercises:

1. Solve these equation

a. $2x + 5 = 11$

$$2x + 5 - 5 = 11 - 5$$

$$2x = 6$$

$$\frac{2x}{2} = \frac{6}{2}$$

$$x = 3$$

c. $5 + 2x = 19$

$$5 + 2x - 5 = 19 - 5$$

$$2x = 14$$

$$\frac{2x}{2} = \frac{14}{2}$$

$$x = 7$$

b. $3x - 6 = 6$

$$3x - 6 + 6 = 6 + 6$$

$$3x = 12$$

$$\frac{3x}{3} = \frac{12}{3}$$

$$x = 4$$

d. $8 = 2x + 5$

$$8 - 5 = 2x + 5 - 5$$

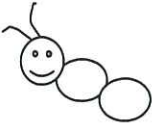
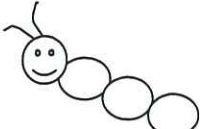
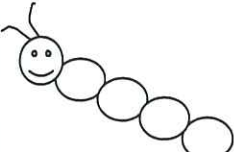


$$3 = 2x$$

$$\frac{2x}{2} = \frac{3}{2}$$

$$x = \frac{3}{2}$$

$$x = 1\frac{1}{2}$$

Growing Patterns**Growing Caterpillars**

				
1 day old	2 days old	3 days old	4 days old	5 days old

PROBLEM:

Students in Ms. Dee's year one class are investigating the relationship between the age and number of circles of a growing caterpillar. Help her students to find out the pattern and rule to draw a caterpillar of any age.

1. Draw the next two caterpillars.
2. Complete the table of values.
3. Plot the data as line graphs on the graph paper provided (the first two points have been plotted for you).
4. Predict what the 10 days old caterpillar will look like and tell how many circles you would need to draw. Explain any pattern you used to find this answer.

4

The 10 days caterpillar will have 12 circle.

I add 2 to the (number of days) age of the caterpillar

Years ^{days} old	Number of circles
1	3
2	4
3	5
4	6
5	7
6	8

CHALLENGE:

- Use your pattern to complete this table without drawing a picture or using manipulatives.
- Write the rule as an algebraic expression for the number of circles (C) in terms of the age (d) of the caterpillars

$$C = d + 2$$

Age in days (d)	Number of circles (C)
10	12
25	27
100	102

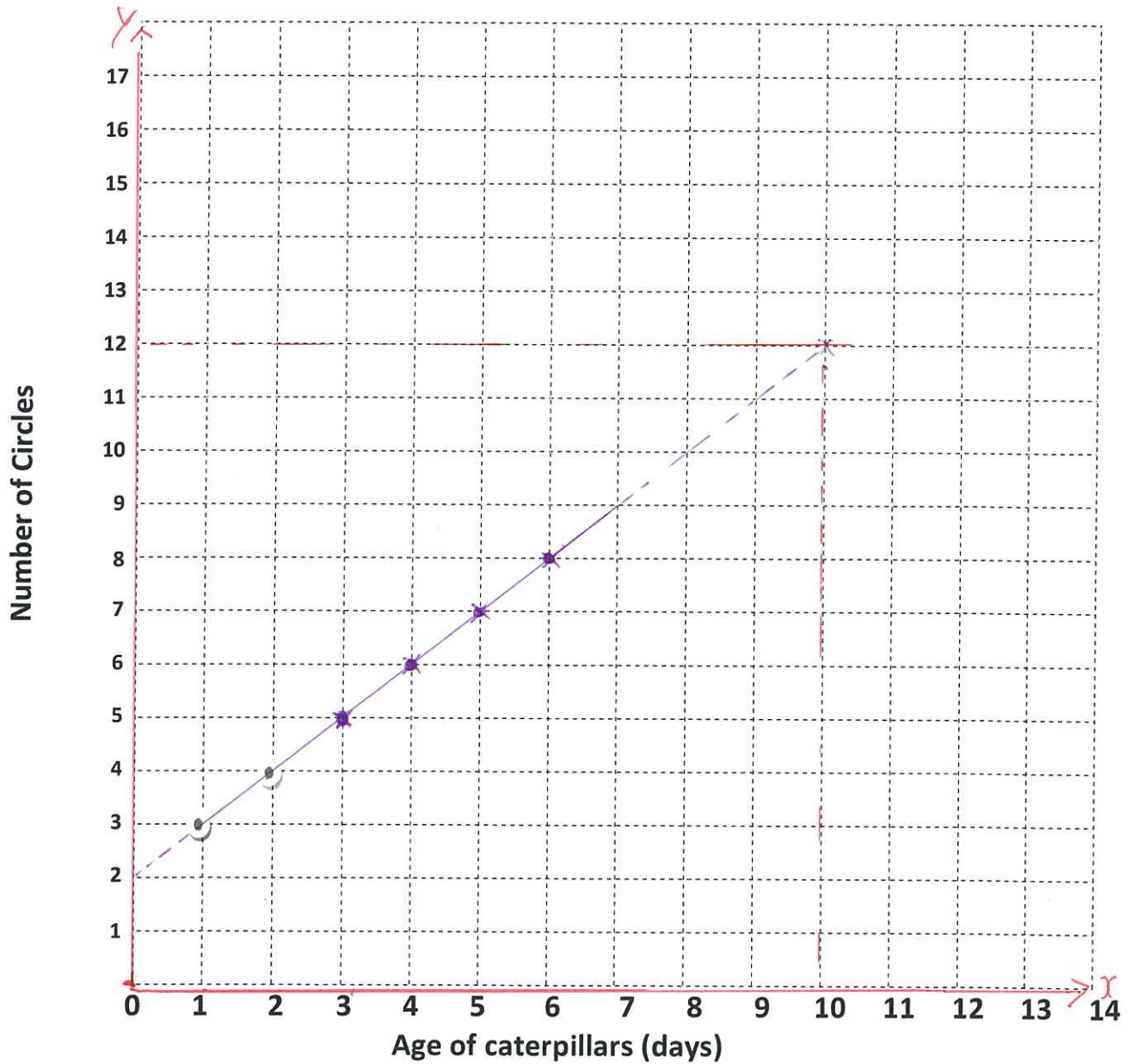
Growing Patterns

Growing Caterpillars

3


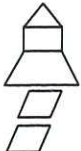
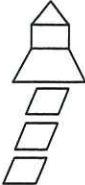


linear

Relationship between number of circles and caterpillar's age



Growing Patterns

The Rocket Pattern

				
Stage 1	Stage 2	Stage 3	Stage 4	Stage 5

PROBLEM:

Students in Mr. Mok's year five class are using pattern blocks to build rocket patterns. Help his students find out the rocket pattern and rule to draw a rocket at any stage.

<ol style="list-style-type: none"> Draw the stage 4 and stage 5 rockets. Complete the table of values. Plot the data as line graphs on the graph paper provided (the first two points have been plotted for you). Predict what the stage 10 rocket will look like and tell how many pieces you would need to build it. Explain any pattern you used to find this answer. 			
	Stage	Rocket pieces + Puffs	Total number of blocks
	1	<u>3+1</u>	4
	2	<u>3+2</u>	5
	3	<u>3+3</u>	6
	4	<u>3+4</u>	7
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>4 The stage 10 rocket will have 10 puffs and the rocket of 3 block, we need 13 blocks to build it.</p> <p>The rule is adding 3 to the stage number</p> </div>	5	<u>3+5</u>	8
	6	<u>3+6</u>	9

CHALLENGE:

- Use your pattern to complete this table without drawing a picture or using manipulatives.
- Write the rule as an algebraic expression for the total number of pieces (P) in terms of the stage of the rocket (s)

$$P = 3 + s$$

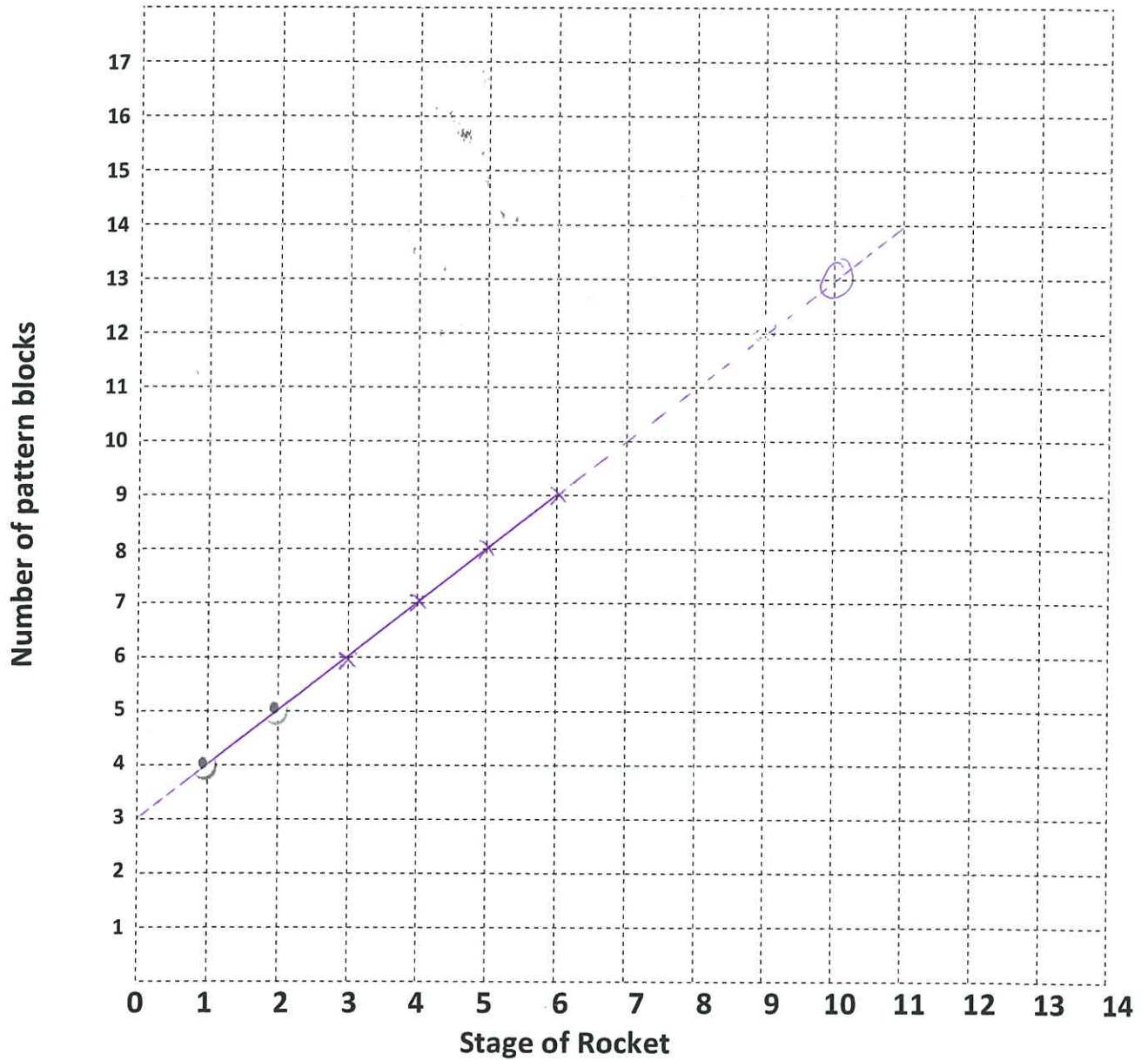
Stage (s)	Total number of pieces (P)
10	<u>13</u>
25	<u>28</u>
100	<u>103</u>

Growing Patterns

The Rocket Pattern

3

Number of pattern blocks used to build different stages rocket



(level 3)

Name: Answer ()

Class: _____

Date: _____

Growing Patterns

Tables & Chairs Investigation

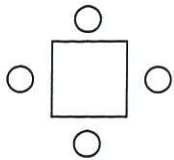


Figure 1

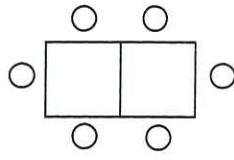
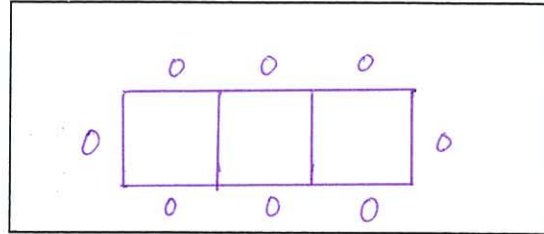


Figure 2



1

Figure 3

PROBLEM: Restaurants often use small square tables to seat customers. One chair is placed on each side of the table. Four chairs fit around one square table [figure 1]. Restaurants handle larger groups of customers by pushing together tables. Two tables pushed together [Figure 2] will seat six customers.

1. Draw a diagram showing how many customers would be seated at three square tables pushed together [Figure 3].
2. Complete the table for reference.
3. Plot the data as a line graph on the graph paper provided (the first two points have been plotted for you).
4. Find patterns you can use to predict the number of customers that may be seated at any size table and describe the pattern in words.

4

The pattern is adding 2 to the previous one.
or add 2 times the number of table to 2.

2

Number of Tables	Number of Customers
1	(2×1) $2 + 2 = 4$ or $2(1+1)$
2	(2×2) $2 + 4 = 6$ or $2(1+2)$
3	(2×3) $2 + 6 = 8$ or $2(1+3)$
4	(2×4) $2 + 8 = 10$ or $2(1+4)$
5	(2×5) $2 + 10 = 12$ or $2(1+5)$
6	(2×6) $2 + 12 = 14$ or $2(1+6)$

CHALLENGE:

- Use your pattern to complete this table without drawing a picture or using manipulatives.
- Write the rule as an algebraic expression for the number of customers (C) in terms of the number of tables (t).

$$C = 2 + 2t \quad \text{or} \quad 2(1+t)$$

Number of Tables (t)	Number of Customers (C)
10	$2 + 20 = 22$ or $2(1+10)$
25	$2 + 2 \times 25 = 52$ or $2(1+25)$
100	$2 + 2 \times 100 = 202$ or $2(1+100)$

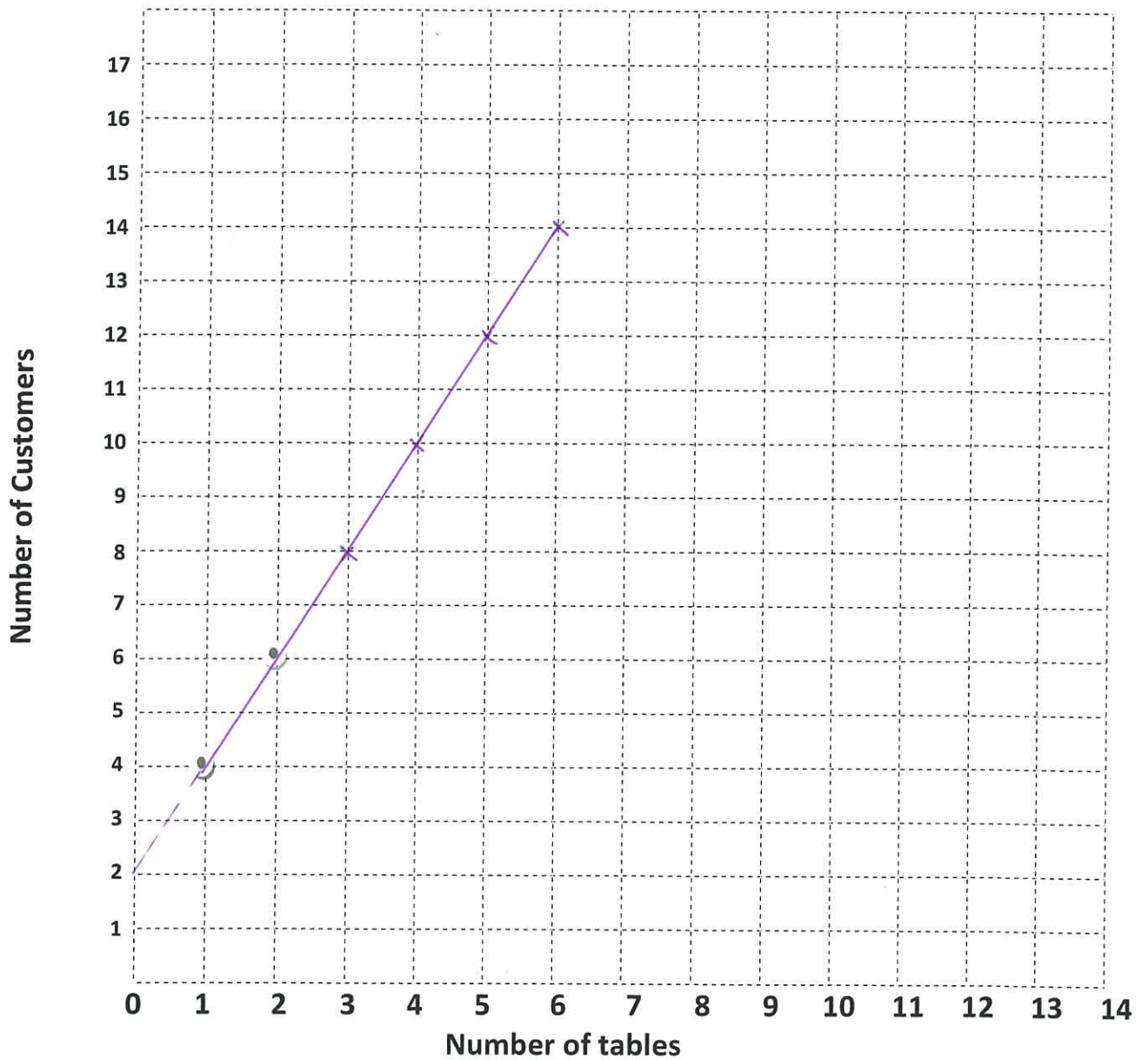
or $2(1+100)$

Growing Patterns

Tables & Chairs Investigation

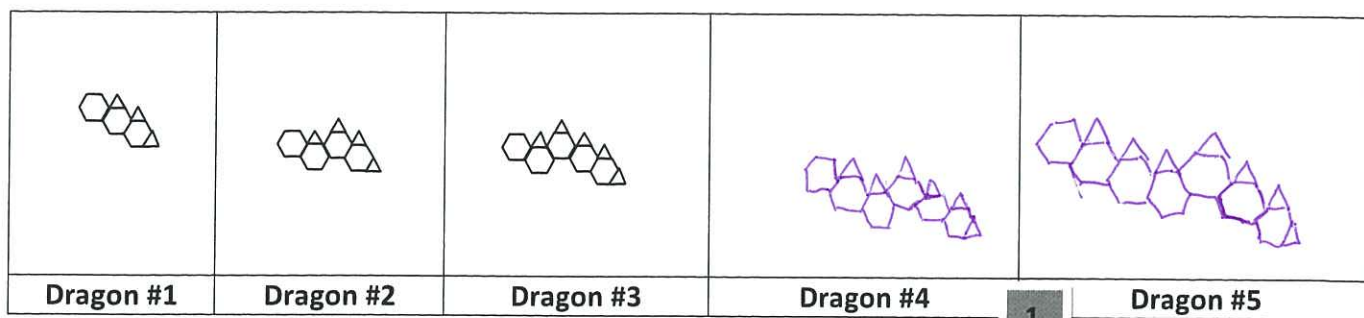
3

Relationship between number of tables and customers



Growing Patterns

Hexagon Dragons



PROBLEM:

Students in Mr. Bridge's class are making up their own growing patterns. Maria uses pattern blocks to make a growing dragon. Help her to finish the tasks that Mr. Bridge has set for her.

1. Use pattern blocks to build and draw the next two dragons in this pattern.
2. Complete the table of values.
3. Plot the data as line graphs on the graph paper provided (the first two points have been plotted for you).
4. Predict what the tenth dragon will look like and tell how many blocks you would need to build it. Explain any pattern you used to find this answer.

2

Dragon #	Number of blocks added	TOTAL number of blocks
1	6	$3+3=6$
2	2	$4+4=8$
3	2	$5+5=10$
4	2	$6+6=12$
5	2	$7+7=14$
6	2	$8+8=16$
7	2	$9+9=18$
8	2	$10+10=20$
9	2	$11+11=22$
10	2	$12+12=24$

4

The 10 dragon will have a hexagonal Head and 11 body with a triangle and hexagon and a tail of triangle. I need 24 blocks to build it. I add the dragon number to 2 and double that number.

CHALLENGE:

- Maria would like to figure out how many blocks he would need to build the 25th and 100th dragons without actually building it. Write the rule in words or an algebraic expression that Maria can use to figure out the total number of blocks for any dragon without having to build it? Explain how your rule works.

add 2 to the number of dragon (n) then double that number.

$$T = (2 + n) \times 2 \Rightarrow 2(2 + n)$$

or $T = 4 + 2n$

Dragon # (n)	Number of blocks added (A)	TOTAL number of blocks (T)
25	2	$27+27=54$
100	2	$102+102=204$

Growing Patterns

Hexagon Dragons

3

Growing Hexagon Dragons

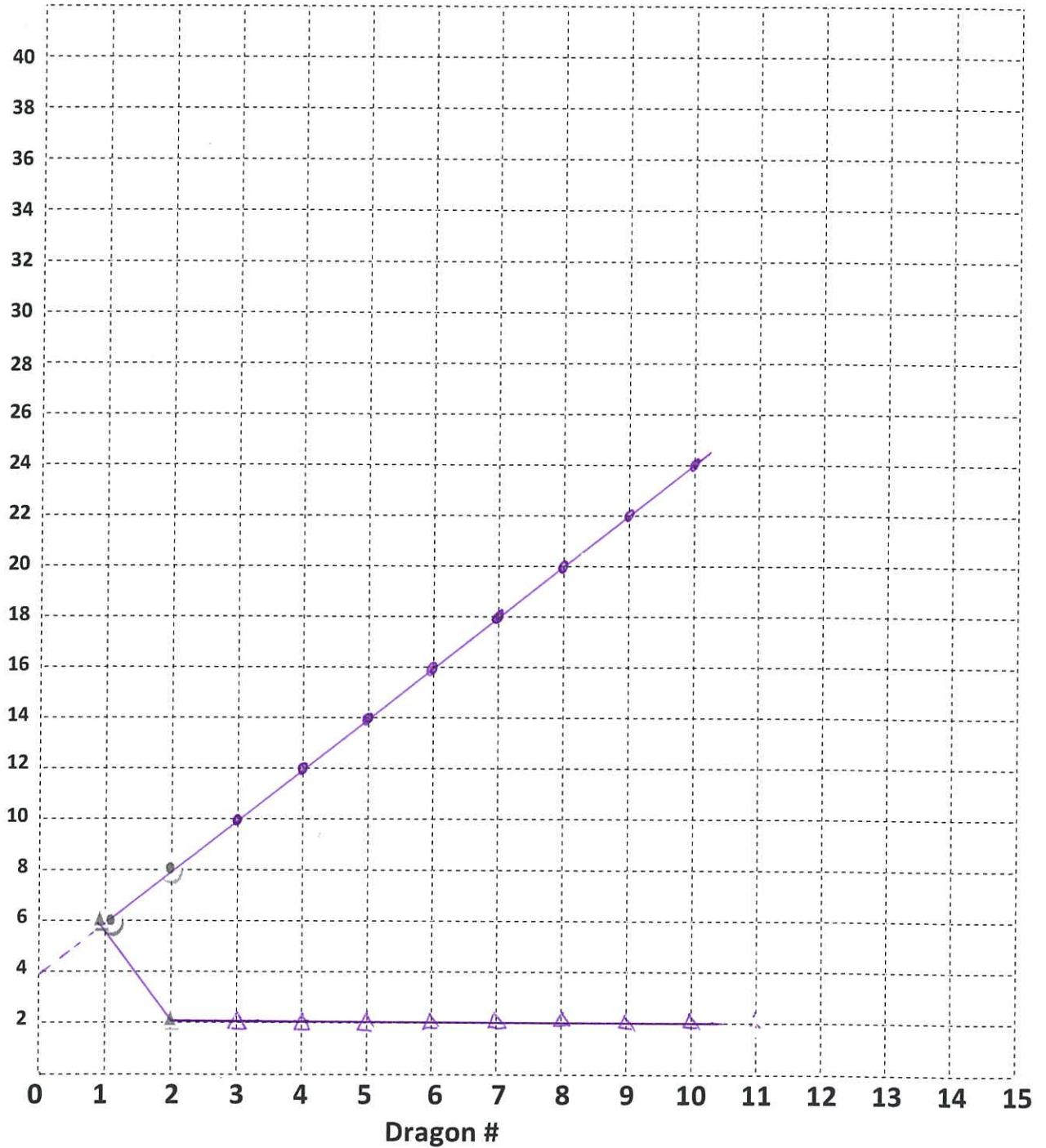
Number of blocks added





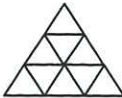
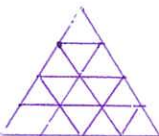
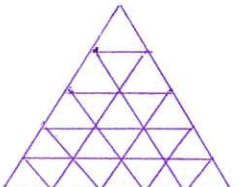
Total number of blocks



Number of blocks



Growing Patterns**Growing Fir Tree**

				
Tree 1	Tree 2	Tree 3	Tree 4	Tree 5

PROBLEM:

Students in Mrs. Como's class are making up their own growing patterns. Angela uses triangle pattern blocks to make a growing fir tree. Help her to finish the tasks that Mrs. Como has set for her.

- Use pattern blocks to build and draw the next two fir trees in this pattern [Tree 4 and Tree 5].
- Complete the table of values.
- Plot the data as line graphs on the graph paper provided (the first two points have been plotted for you).
- Predict what the tenth fir tree will look like and tell how many blocks you would need to build it. Explain any pattern you used to find this answer.

4 The 10th fir tree will have 10 layers with 1 on top and 19 at the bottom. I need 100 blocks to make it.
The total number of blocks is the square of the tree #.

Tree #	Number of blocks added	TOTAL number of blocks
1	$2 \times 1 - 1 = 1$	$1^2 = 1$
2	$2 \times 2 - 1 = 3$	$2^2 = 4$
3	$2 \times 3 - 1 = 5$	$3^2 = 9$
4	$2 \times 4 - 1 = 7$	$4^2 = 16$
5	$2 \times 5 - 1 = 9$	$5^2 = 25$
6	$2 \times 6 - 1 = 11$	$6^2 = 36$
7	$2 \times 7 - 1 = 13$	$7^2 = 49$
8	$2 \times 8 - 1 = 15$	$8^2 = 64$
9	$2 \times 9 - 1 = 17$	$9^2 = 81$
10	$2 \times 10 - 1 = 19$	$10^2 = 100$

CHALLENGE:

- Use your pattern to complete this table without drawing a picture or using manipulatives.
- Write the rules as algebraic expressions for number of blocks added (A) and the total number of blocks (T) in terms of the number of tree (n).

$$A = 2n - 1$$

$$T = n^2$$

Tree # (n)	Number of blocks added (A)	TOTAL number of blocks (T)
15	$2 \times 15 - 1 = 29$	$15^2 = 225$
25	$2 \times 25 - 1 = 49$	$25^2 = 625$
100	$2 \times 100 - 1 = 199$	$100^2 = 10000$

Growing Patterns

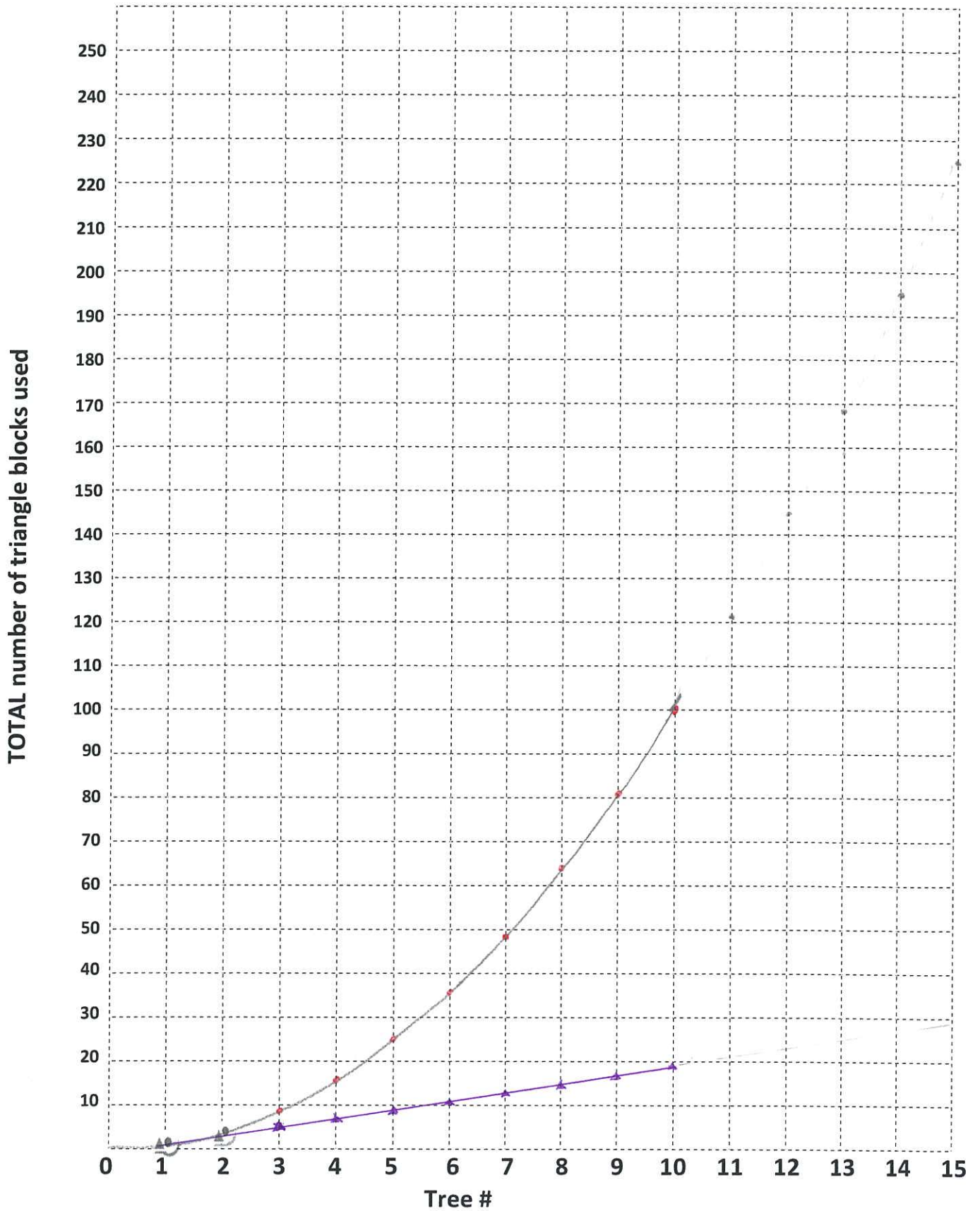
Growing Fir Trees

3

Growing Fir Trees

Number of blocks added ▲

Total number of blocks ●



Answer Keys for H&H Exercise

REVIEW SET 18A

1 a $2xy$ b $M = 3n + d$ c $ab + 3c$ d $\frac{n}{3}$ e $\frac{a+b}{c}$
f $\frac{100}{x-3}$

2 a $2c$ b $3(a+6)$ c $t+5$ d $n-d$ 3 $\mathcal{L}(xy)$

4 $(2x+y+5z)$ dollars 5 a $y=31$ b $y=11$

6 a

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,

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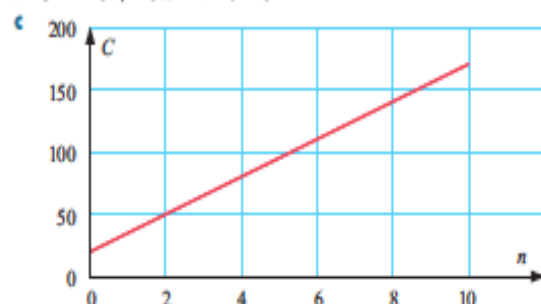
Figure number (n)	1	2	3	4	5
Matchsticks needed (M)	4	7	10	13	16

c $M = 3n + 1$ d i 22 ii 304

7

n	0	1	2	3	4	5
C	20	35	50	65	80	95

a $C = 20 + 15n$ b \$425



EXERCISE 20A

1 a equation b expression c expression
d equation e equation f expression

2 a $\square = 10$ b $\square = 13$ c $\square = 13$ d $\square = 19$
e $\square = 6$ f $\square = 24$ g $\square = 5$ h $\square = 6$
i $\square = 5$

3 a $x+7=10$ b $x-5=11$ c $4x=12$ d $\frac{x}{10}=2$

EXERCISE 20B

1 a $a=8$ b $p=8$ c $n=7$ d $t=40$
e $s=52$ f $d=6$ g $n=7$ h $a=25$
i $b=63$ j $t=0$ k $m=12$ l $t=-5$
m $x=5$ n $\square=3$ o $y=-3$ p $x=0$
q $x=-4$ r $t=-3$ s $x=20$ t $x=-3$
u $x=13$ v $n=3$ w $x=48$ x $t=5$

2 a $x=5$ b $x=4\frac{1}{2}$ c $x=7$ d $x=6$
e $x=-1$ f $x=-2$

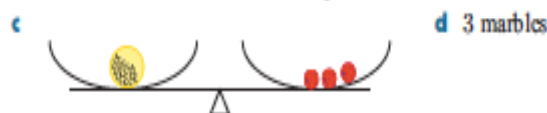
3 a $x=7$ b $x=10$ c $x=9$ d $x=2\frac{1}{2}$
e $x=1\frac{1}{4}$ f $x=4$

EXERCISE 20C.1

1 a $O=2V$ b $2C=3O$ c $X=3V+3O$
d $y=2O$ e $g=y+O$ f $t=O$
g $e=w$ h $B=4b$ i $M=5$

2 a take three strawberries b 8 strawberries
c 4 strawberries

3 a take 6 marbles b remove 1 golf ball



EXERCISE 20C.2

1 a $x+3=7$ b $x+12=10$ c $x=13$ d $2x=10$

2 a $x-2=6$ b $x=-7$ c $-x=4$ d $3x=-7$

3 a $2x=12$ b $6x=3$ c $x=10$
d $7(x+1)=63$ e $x+1=-2$ f $1-x=12$

4 a $x=3$ b $x+2=2$ c $x+3=0$
d $x+3=5$ e $x=\frac{14}{3}$ f $x-1=3$
g $x-4=-1$ h $x+2=3$

EXERCISE 20D

1 a $\div 3$ b -5 c $+4$ d $\times 7$ e $+\frac{3}{4}$ f $\div \frac{2}{3}$
g -10 h $\times \frac{1}{3}$

2 a x b x c x d x e x f x g x h $2x$

3 a $x=3$ b $x=-9$ c $x=-3$ d $x=-15$
e $x=2$ f $x=6$

4 a $y=11$ b $y=2$ c $y=5$ d $y=43$
e $y=0$ f $y=-17$

5 a $t=2$ b $t=5$ c $t=2$ d $t=5$
e $t=4$ f $t=-3$ g $t=-8$ h $t=8$
i $t=-7$

6 a $d=6$ b $d=28$ c $d=16$ d $d=30$
e $d=-12$ f $d=-7$

7 a $x=-7$ b $x=11$ c $d=-10$ d $p=14$
e $g=5$ f $x=32$ g $m=4$ h $y=8$
i $k=-8$ j $s=-4$ k $t=4$ l $t=-9$
m $p=38$ n $y=-4$ o $k=-14$ p $n=-8$
q $e=13$ r $n=-9$ s $d=-72$ t $w=13$
u $y=49$

REVIEW SET 20A

- 1 6 2 a equation b $\div 6$ c $3x = 5$ d $x = -2$
 3 $x = 5$ 4 a $2+ = 3$ b $2t = a + v$
 5 a $x = 6$ b $x = 6$ c $x = -8$ d $x = -3$

6 a $\boxed{x} \xrightarrow{\times 3} \boxed{3x} \xrightarrow{+8} \boxed{3x+8}$

b $\boxed{x} \xrightarrow{-3} \boxed{x-3} \xrightarrow{\div 4} \boxed{\frac{x-3}{4}}$

7 a $\boxed{x} \xrightarrow{+4} \boxed{x+4} \xrightarrow{\div 6} \boxed{\frac{x+4}{6}}$

b $\boxed{x} \xrightarrow{\times 4} \boxed{4x} \xrightarrow{-5} \boxed{4x-5}$

8 a $\boxed{\frac{x}{5} + 8} \xrightarrow{-8} \boxed{\frac{x}{5}} \xrightarrow{\times 5} \boxed{x}$

b $\boxed{3(x-9)} \xrightarrow{\div 3} \boxed{x-9} \xrightarrow{+9} \boxed{x}$

- 9 a $x = \frac{7}{4}$ b $x = -12$ c $x = 36$ d $x = \frac{8}{11}$
 e $x = 7$ f $x = 6$

10 €6

REVIEW SET 20B

- 1 a $\square = 45$ b $\square = 4$
 2 a $a = 42$ b $3x = 17$ c multiplying by 7 d $x = -24$
 3 $x = 3$ 4 $3 - x = 10$ 5 a $+5$ b $\div \frac{1}{2}$ c $\times 6$
 6 a $t = -4$ b $t = 6$ c $t = 5$ d $t = -24$

7 a $\boxed{x} \xrightarrow{\div 4} \boxed{\frac{x}{4}} \xrightarrow{-7} \boxed{\frac{x}{4} - 7}$

b $\boxed{x} \xrightarrow{+6} \boxed{x+6} \xrightarrow{\times 5} \boxed{5(x+6)}$

8 a $\boxed{x} \xrightarrow{\times 3} \boxed{3x} \xrightarrow{-7} \boxed{3x-7} \xrightarrow{\times 2} \boxed{2(3x-7)}$

b $\boxed{x} \xrightarrow{\times 2} \boxed{2x} \xrightarrow{+3} \boxed{2x+3} \xrightarrow{\div 6} \boxed{\frac{2x+3}{6}}$

9 a $\boxed{\frac{5x-3}{4}} \xrightarrow{\times 4} \boxed{5x-3} \xrightarrow{+3} \boxed{5x} \xrightarrow{\div 5} \boxed{x}$

b $\boxed{6(2x+1)} \xrightarrow{\div 6} \boxed{2x+1} \xrightarrow{-1} \boxed{2x} \xrightarrow{\div 2} \boxed{x}$

- 10 a $x = 9$ b $x = \frac{3}{2}$ c $x = 39$ d $x = -10$
 e $x = 3$ f $x = 21$

11 19 truffles

Answer Keys for Longman Exercise

Ex4A: (Longman Primary Mathematics 6C p.25)

1. $3x + 8 = 26$ ($x=6$)
2. $5y + 7 = 52$ ($y=9$)
3. $8z + 10 = 34$ ($z=3$)
4. $7w + 5 = 5$ ($w=0$)
5. $4k + 6 = 18$ ($k=3$)
6. $6y - 12 = 6$ ($y=3$)
7. $14x - 32 = 10$ ($x=3$)
8. $9z - 40 = 23$ ($z=7$)
9. $12d - 18 = 30$ ($d=4$)
10. $10w - 50 = 0$ ($w=5$)

Example of proper workings:

$$\begin{aligned} 1. \quad & 3x + 8 = 26 \\ & 3x + 8 - 8 = 26 - 8 \\ & 3x = 18 \\ & 3x \div 3 = 18 \div 3 \\ & x = 6 \end{aligned}$$

Checking:

$$\begin{aligned} \text{L.H.S.} &= 3x + 8 \quad (\text{when } x = 6) \\ &= 3 \times 6 + 8 \\ &= 18 + 8 \\ &= 26 \\ &= \text{R.H.S.} \end{aligned}$$

Ex4A: (Longman Primary Mathematics 6C p.27)

1. 6 times a number minus 15 equals 33. Find the number.

(Answer for number 1 shows the proper full steps, remember to line up your equal sign.)

$$\begin{aligned} & \text{Let } x \text{ be the number} \\ & 6x - 15 = 33 \\ & 6x - 15 + 15 = 33 + 15 \\ & 6x = 48 \\ & 6x \div 6 = 48 \div 6 \\ & x = 8 \\ & \text{The number is 8.} \end{aligned}$$

Checking: If the number is 8,
6 times of the number is 48,
after minus 15 by 48 it equals 33.
Therefore the number is 8.

2. (Let y be the number; $3y+8=23$; $y=5$; The number is 5.)
3. (Let x be the number; $9x+26=44$; $x=2$; The number is 2.)
4. (Let z be the number; $7z-13=36$; $z=7$; The number is 7.)
5. (Let b mL be the amount of orange juice each bottle contained;
 $3b - 1200=300$; $b=500$; Each bottle contained 500 mL of orange juice.)
6. (Let $\$c$ be the price of each adult ticket. $4c+84=644$; $c=140$; Each adult ticket costs \$140.)
7. (Let $\$x$ be the price of each ice lolly. $8x+5=37$; $x=4$; Each lolly costs \$4.)
8. (Let $\$y$ be the price of each tin of ham. $7y - 6 = 50$; $y=8$; Each tin of ham costs \$8.)
9. (Let w years old be the age of her son. $5w - 2 = 38$; $w=8$; Her son is 8 years old.)
10. (Let x be the number of bookmarks in each set originally.
 $2x - 4 = 16$; $x=10$; There were 10 bookmarks in each set originally.)
11. (Let $\$w$ be the number of pencils tom bought. $4w + 4 = 16$; $w=3$; Tom bought 3 pencils.)

Answer Keys for Longman Exercise

Ex5A: (Longman Primary Mathematics 6C p.30)

1. $\frac{e}{5} + 8 = 73$ ($e=325$)

4. $\frac{w}{10} - 12 = 8$ ($w=200$)

2. $\frac{y}{8} - 5 = 6$ ($y=88$)

5. $\frac{y}{9} + 23 = 23$ ($y=0$)

3. $\frac{u}{7} + 4 = 18$ ($u=98$)

6. $\frac{m}{6} - 9 = 0$ ($m=54$)

1. $\frac{e}{5} + 8 = 73$
 $\frac{e}{5} + 8 - 8 = 73 - 8$
 $\frac{e}{5} = 65$
 $\frac{e}{5} \times 5 = 65 \times 5$
 $e = 325$

Ex5B: (Longman Primary Mathematics 6C p.32)

1. Kevin poured a bottle of soft drink into 5 glasses equally. Then he drank 100 mL of the soft drink from one of the glasses. He has 150 mL left in that glass. How many millilitres of soft drink did the bottle contain?

Let c mL be the amount of soft drink the bottle contained.

$$\begin{aligned}\frac{c}{5} - 100 &= 150 \\ \frac{c}{5} - 100 + 100 &= 150 + 100 \\ \frac{c}{5} \times 5 &= 250 \times 5 \\ c &= 1250\end{aligned}$$

The bottle contained 1250 mL of soft drink.

Checking:

If the bottle contain 1250 mL of soft drink, when poured equally into 5 glasses, each glass contain 250 mL of soft drink. After drinking 100 mL from 250 mL, 150 mL of soft drink will be left in that glass. Therefore, the bottle contained 1250 mL of soft drink.

2. (Let y be the number of biscuits in the packet. $\frac{y}{4} + 5 = 17$, $y=48$, There are 48 biscuits in the packet.)
3. (Let w be the number of plums in the bag. $\frac{w}{6} - 8 = 5$, $w=78$, There were 78 plums in the bag.)
4. (Let k be the number of mangoes in the box. $\frac{k}{63} - 6 = 3$, $k=27$, There were 27 mangoes in the box.)
5. (Let b be the number of bananas in the basket. $\frac{b}{8} + 3 = 15$, $b=96$, There were 96 bananas in the basket.)